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ABSTRACT

This paper describes how the applications of technology to library functions generally follow the three-phase pattern set by business. In phase one, technology is applied to the automation of manual procedures in order to save time and/or money. Phase two involves the use of technology for non-traditional, innovative approaches to traditional functions, while phase three represents the use of computers to provide non-traditional services or processes. Libraries are seen to be moving into phase two and three applications, and it is postulated that developments in teleconferencing, electronic mail, and electronic publishing will have an important impact on the functions of the library in the future. Twenty-two references are listed. (Author/FM)

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THE FUTURE OF THE LIBRARY IN AN ELECTRONIC SOCIETY:

THE STATE OF THE ART

by

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University of Pittsburgh, 1980

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THE FUTURE OF THE LIBRARY IN AN ELECTRONIC SOCIETY: THE STATE OF THE ART

Did we come here to laugh or cry?
Are we dying or being born?

Terra Nostra by
Carlos Fuentes

The age of rapid advances in technology has overtaken the library. For hundreds of years, the library and its functions and processes changed very little. A librarian of the nineteenth century would have found little of great surprise if he had been transported into a library of the mid-twentieth century. However, in the past ten years, the complexion of the modern library has been greatly affected by the technology of the computer age.

Applications of technology to library functions are generally following the following pattern set in business:

1. Phase One - Technology is applied to the automation of manual procedures in an effort to save time and/or money. An example of this phase would be the use of computers to control circulation records.

2. Phase Two - In phase two, libraries use technology for non-traditional, innovative approaches to traditional functions. Interrelated systems that serve as an on-line catalog, acquisition modules and inventory control are examples of phase two applications.

3. Phase Three - Computers are used to perform non-traditional services. An example of phase three acceptance and application of technology would be the provision of on-line current awareness service to faculty members. (1)*

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*References at end of paper.

Most libraries that use automated procedures are now in phase one of computer application with a few leaders venturing into phase two.

Rapid advances in technology promise more applications to libraries that will allow innovative adaptations of technology to both the traditional functions of the modern library and the non-traditional functions that may become the norm of library service. Mass storage techniques through the use of magnetic tape and disk are available today that would allow the storage of an entire library's collection of books, full text, in a very small area. The new bubble memory technology has made huge storage areas with nano-second (one billionth of a second) access time both feasible and cost effective.[2] Data storage costs have been decreasing at an average annual rate of nearly 20 percent over the last 15 years, and access speed is increasing at approximately 10 percent per year.[3] Another promising development is holography, a recording technique applicable to information storage and retrieval. Holography techniques allow packing densities of one megabit/cm^2 with a readout rate of 750 megabits per second. In the use of holography, which allows a direct content addressable memory, indexing consistency becomes of paramount importance.[4]

Rapid advances are also being made in the communication of data. Fiber optics is a new technology that promises improved computer communications. Fiber optic benefits include greatly increased bandwidth, absence of "crosstalk," increased safety, reduced cost and dramatically reduced cable weight.[5] Satellite communication promises to have a profound effect on libraries. Communications Satellite Corporation plans to ask the Federal Communications Commission for permission to

broadcast pay television directly to American homes via satellite in 1983. The service, which would be distance insensitive, could be delivered to an individual anywhere. Programming would include first run movies, sports, educational and cultural materials as well as data and text transmission. Costs are projected at between $15.00 and $22.50 per month to each subscriber.[6] In another development, the public library of Columbus, Ohio, and Warner Cable Corporation are participating in a project funded by OCLC Inc. to test the use of QUBE, Warner's two-way, interactive cable television, for the home delivery of library services.[7]

Society as a whole has also been greatly affected by the new technology. Indeed non-library applications of computer technology are well into phase three. Social observer, Alvin Toffler, has stated that society is entering what he calls the "third wave." In the third wave, Toffler sees the growth of the electronic cottage in which a person can earn his livelihood through electronic communication with his supervisors, customers, and even students.[8] Several other applications of technology in the business or scientific community have particular importance to the functions of the present and future library. The most prominent of these applications are electronic mail, computer conferencing, and the electronic publication of newspapers, monographs, journals and indexes.

Computerized Conferencing

Murray Turoff and other researchers at the New Jersey Institute of Technology are engaged in research projects to study the potentials of computerized conferencing as a medium for problem solving and decision making. Their initial study involved replication of Robert

Bales' experiment in classification of group interaction into 12 categories. Twelve groups were studied. Four groups met face to face while eight groups communicated via a computer. Preliminary findings were:

1.) There was more giving of opinion in computerized conferencing; less overt expression of agreement or disagreement.

2.) There was more equal participation in the computerized conferences.

3.) There were no significant differences in the subjective satisfaction of participants.

4.) Two of the eight computerized conference groups could not reach a unanimous decision within the forty minute time limit; all of the other groups reached agreement.

These findings were noted as being preliminary, based on a small sample and needing further study.

A problem that has been observed by Turoff and his assistants is the difficulty of a large heterogeneous group to focus on the issues and goals of a computerized conference. Turoff suggests that in a face to face conference, the goal focusing process is handled by event scheduling. Typically a welcoming cocktail party brings the group together followed by several parallel sessions that eventually culminate in a plenary session. The design, development and evaluation of software tools for the management and structuring of on-line conference communication is one of the major focuses of research at NJIT.[9] Turoff sees the computerized conferencing systems as a "living library" by which users can consult with experts.[10]

Electronic Mail

Electronic mail would allow people to receive their daily mail and messages in digital form over in-home or in-office computers. Very few letters would be transmitted or recorded in paper format. Several commercial firms are interested in entering the electronic mail marketplace. One firm, CYBERTEK Computer Products, is now offering an electronic mail system for medium to large size companies. The firm is advertising the ability to send letters at a cost saving of 25 to 50 percent off the average cost of $5.60 for a printed letter. Letters are delivered in seconds.[11]

In July, 1979, President Carter endorsed the limited use of electronic transmission of mail by the United States Postal Service. The USPS has indicated a readiness to proceed with two major electronic delivery systems over the next few years. The first phase would enable companies to communicate directly with other companies. The second phase, which would allow individuals to send handwritten letters, could be fully implemented in 20 years. Shortly after Carter's approval, a Senate appropriation subcommittee acted to bar the USPS from deploying a full-fledged electronic mail system. The sentiment of Congress was that there was a reluctance to support a government service where the private sector can provide a cheaper, more reliable service. The USPS has announced that it will seek bids from commercial firms to jointly offer the service.[12]

In Great Britain, the Post Office offers an electronic mail delivery service called Prestel. Prestel, formerly known as Viewdata, uses the telephone communication lines to bring information on train,

bus, or airline schedules, consumer information, pages from newspapers, journals or books, as well as electronic letters and messages, into the homes of about 25,000 Britons. Another 25,000 terminals are located in businesses and in public places. The British Post Office estimates that by the end of 1983, there will be three million sets connected to Prestel.[13]

Electronic Publishing

The problems associated with the dissemination of information, especially scientific and technical information, have been the focus of many studies. The Ackoff study[14] and the recent King Research Co. reports[15] have noted the problems of extreme time lag from the beginning of a research study to its appearance in printed form, the undemocratic distribution of the information through the "invisible college", and the escalating costs of printing, packaging and distributing the new information. A partial solution to the problem of making critical, new information available to aid in the solution of modern issues is electronic publishing.

In 1975, the National Science Foundation issued a call for proposals for studies of an electronic alternative to the paper-based communication of information.

In a study responding to the call from the National Science Foundation, Donald King and Nancy K. Roderer of King Research demonstrated that journal articles could be economically incorporated into a comprehensive, electronic data-base. The journal articles will be composed, edited, and refereed on-line. Those articles meeting the standards of the data base will be added immediately thus eliminating the time lag so detrimental to effective scientific communication.

According to the staff of King Research, the electronic alternative, while highly desirable and currently achievable, will evolve gradually over the next few years. In addition, there are some technical problems, such as costly graphics in some articles, telecommunications costs, and communication speed, that will have to be addressed.[16]

Many publishers of books, newspapers and journals are using text editing terminals to prepare their materials for print-on-paper publications. In fact, Standard & Poor's Industry Survey has found that the market for editorial processing systems has reached the 60 to 70 percent saturation level. Standard & Poor also noted a trend toward on-line news services such as The Source.[17]

These external forces of phase three technology when coupled with internal library problems such as the exponential growth of knowledge, the inability of libraries to acquire, process and deliver the needed information effectively, the spiraling costs of books and journals and decreasing library budgets are causing library leaders to puzzle over the future of the library. Some writers have even suggested that libraries will "wither away, their historic duty done."[18]

What will the library of the future look like? Several writers have investigated the library of the future.

Vannevar Bush writing in Atlantic Monthly in 1945 envisioned a "mechanized private file and library" called Memex. Through the use of microfilm, scientists could develop large personal libraries of documents relevant to their work. In addition to published documents, the scientist could add his personal notes and correspondence to his

microfilm file. Most importantly, Bush envisioned a retrieval system that used associate trails to pinpoint the exact information needed and its location in his files.[19]

In 1961, a study under the sponsorship of the Council on Library Resources was begun to explore the "concepts and problems of the libraries in the future." The "future" was defined as the year 2000. Led by J. C. R. Licklider, the team studied two major phases of the problem: 1. Concepts of Man's Interaction with the Body of Recorded Knowledge and 2. the Use of Computers in the Storage, Organization & Retrieval of the Body of Knowledge.

Licklider addressed the concept of discarding schemata at the system and subsystem level while retaining those at the component level. At the component level, the printed page is described as superb. Its physical qualities of small size, light weight, flexibility are complimented by its low cost. However, when pages are bound together to form a book, many of the best physical qualities are lost. Books are heavy, bulky and expensive. More importantly, the information displayed so well on the printed page is buried in a flood of pages and information.

At the system level, the library, the problems are compounded. Thousands of books lined up on hundreds of shelves and indexed by a very inadequate general subject description hide the information needed by the user. Licklider proposed that we should be prepared to reject the schema of the physical library with its books, shelves, index files, and circulation desks. In its place, Licklider proposed a "procognitive system" that would make use of some of the concepts of our present library system such as the printed page, (for short term display only),

the hierarchies of text and article description, the different formats of information, and the catalog, index, descriptors and thesaurus.

Coupled with a computer, the "procognitive system" would be capable of storing and accessing vast amounts of information. Licklider envisioned a console with a keyboard, an input-output screen, a pen that can be used to "communicate" with a sensitive screen, a camera, and a microphone. Through the use of the keyboard, screen, and microphone, one would be able to establish a dialogue with the computer.[20]

In early 1980, Library Journal surveyed 20 top executives in information companies to gather their views on two questions:

1.) Which new product or technical innovation offers the most promise for information services for public, academic or special libraries and 2.) Briefly describe the library of 1985 based on your knowledge of currently available or forthcoming products or technologies.

Although less than half of the twenty leaders responded, the responses forecasted important changes for the next five years in libraries. Several of the responding experts foresaw the home computer as having an important impact on the future library. Other innovations mentioned were improved satellite communication that will facilitate document delivery, the increase in importance of videotext services for the delivery of information to home and office, and the application of microcomputers to library processes.

The experts' view of the library of 1985 ranged from an automated version of the traditional library that continues to provide traditional services in a much more effective style to a library very unlike the ones we know today. Interestingly, two of the respondents predicted an increasingly important role for the librarian in the future library.[21]

F. W. Lancaster at the University of Illinois Library Research Center was awarded a National Science Foundation grant in 1978 to study the impact of a paperless society on the future research library. The study is divided into three phases: 1.) a review of the literature 2.) a Delphi study in which forecasts related to the future of publishing were collected and 3.) the development by solicitation of opinion of a scenario to depict the library of 2001. In the Delphi section of the study, a questionnaire on the technical and economic feasibility and the desirability of the electronic publication of various types of material solicited responses from a sample of librarians, publishers and "technologists."

In the scenario development phase, senior staff members of the University of Illinois Library at Urbana-Champaign were interviewed to determine their perceptions of the future. The scenario developed from the interviews was circulated to all deans of accredited library schools, to one-half of the directors of member libraries of the Association of Research Libraries, and to selected librarians in industry.

The second draft scenario shows a library much different from the one we know today. The artifact of the book has been replaced by the electronic storage of data. The publishing industry has changed from print-on-paper to electronic transmission. Printed books and journals are the exception, not the rule. Library staff size, as well as collection size, has been drastically reduced. The remaining librarians are very oriented to community and individual service. The librarian of 2001 is a true information consultant.

With the radical changes in libraries, library education has also changed. The deinstitutionalization process of the future library

has led to a much broader course of study. Communication process study, both human to human and man to machine, are important factors of graduate information science education.[22]

Conclusion

The library is no longer a quiet island of refugee in a changing society. Libraries are changing and must change if they are to survive in a system that demands accountability. Further research is needed to determine the views and attitudes of a wide segment of library leaders, public officals, network directors and library users toward the library of the future.

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